REMARKS

Claims 1-18 stand rejected under 35 USC §103(a) as being unpatentable over Funke, U.S. patent 4,850,045 in view of Ducaroir et al., U.S. patent 6,208,621.

Each of the claims 1, 2, 3, 7, 8, 11, 12, 13, 14, 15, and 18 have been amended to more clearly state the invention. Each of the claims 1-18, as amended, is believed to be in condition for allowance. Reconsideration and allowance of each of the claims 1-18, as amended, is respectfully requested.

Funke, U.S. patent 4,850,045 discloses a fiber optic hub (10) for local area networks (15, 35) and other data communication systems including an internal self-diagnostic and cable test capability for permitting off-line testing of the hub (10) and of fiber optic cables connected to the hub (10). The hub (10) includes a plurality of optical interfaces (30a-30p) each having an optical receiver section (36) and an optical transmitter section (37) and hub-processing circuitry (32) connected to the optical interfaces (30a-30p) for processing data signals received by the optical receiver sections (36) and for providing the processed data signals to the transmitter sections (37) to be transmitted back through the network (15, 35) thereby. Hub (10) further includes a test signal source (61) for generating a test signal to be transmitted from the transmitter sections (36) of one or all of the optical interfaces (30a-30p), and a test signal detector (80) connected to the receiver sections (37) of the interfaces (30a-30p) for detecting a test signal received by any of the receiver sections (37) and for generating an error indicator signal when the received test signal differs from the transmitted test signal. The transmitter and receiver sections (36, 37) of any hub

optical interface (30a-30p) can be conveniently tested by looping a fiber optic cable from a transmitter section (37) of any optical interface (30a-30p) to the receiver section (37) of any other optical interface (30a-30p) and monitoring an error indicator (LED) (80) illuminated by the error indicator signal. The hub (10) also provides a means for testing fiber optic cable connected to the hub (10).

Ducaroir et al., U.S. patent 6,208,621 discloses an apparatus and method for testing the ability of a pair of serial data transceivers to transmit serial data at one frequency and to receive serial data at another frequency. A serial communication device includes a first and second serial data transceivers and a multiplexer formed upon a monolithic semiconductor substrate. Each serial data transceiver includes a receiver and a transmitter which transmits serial data in response to a clock signal. The second serial data transceiver is coupled to receive a reference clock signal. The multiplexer facilitates testing, and is coupled to the first serial data transceiver. The multiplexer receives the reference clock signal, a test clock signal, and a test signal, and provides either the reference clock signal or the test clock signal to the first transceiver dependent upon the test signal. The reference and test clock signals have different frequencies. The multiplexer provides the reference clock signal to the first transceiver when the test signal is deasserted, and provides the test clock signal to the first transceiver when the test signal is asserted. During testing, the output of the transmitter of one transceiver is coupled to the input of the receiver of the other transceiver, and the test signal is asserted. Each receiver produces parallel output test data. A match between the two sets of parallel output test data and the parallel input

test data demonstrates the abilities of both transceivers to transmit and receive serial data at different frequencies.

The present invention solves a problem of testing a parallel optical transceiver. In a production line, when the combined module is built and adjusted to a point where the module should be functional, it is desirable to test the module to determine that the module is functional. Such preliminary testing should identify if the manufacturing process can continue, or if the module should be scrapped, reworked or sent to another manufacturing line for testing and readjusting channels individually. It is desirable to provide such testing quickly so that manufacturing time could be saved. However, testing each of the parallel channels typically is very time consuming and requires complex, cumbersome and costly test equipment. When manufacture of a parallel optical transceiver is completed, the problem of quickly testing the parallel optical transceiver in the field is the same as during manufacture. To test the parallel optical transceiver, each of the parallel channels typically must be separately done using the same type of complex, cumbersome and costly test equipment used during manufacture.

Each of the independent claim 1, 3, 11, 12, and 18 respectively reciting methods and apparatus for testing a parallel optical transceiver, as amended, expressly recite an optical wrap plug and an electrical wrap plug or the steps of providing an optical wrap plug and an electrical wrap plug for connecting in series each of a plurality of parallel receiver and transmitter channels of each of said parallel optical transceivers;

respectively optically connecting each respective channel transmitter to a

next respective channel receiver in said series of said plurality of said parallel receiver and transmitter channels using said optical wrap plug;

respectively electrically connecting said channel receiver and said channel transmitter of each said parallel receiver and transmitter channels using said electrical wrap plug.

The total teaching of the Funke patent and the Ducaroir et al. patent, considered individually or considered together in combination, do not suggest these limitations of the claimed methods and apparatus for testing a parallel optical transceiver. The Funke patent does not disclose, and further does not suggest or provide any motivation for connecting in series each of a plurality of channels of said parallel optical transceiver, as taught and claimed by Applicants. The additional steps of: applying a predefined data pattern to a first channel of said series connected plurality of channels; detecting an output from a last channel of said series connected plurality of channels; and comparing said applied predefined data pattern with said output to identify functional operation of said parallel optical transceiver, likewise are not disclosed, nor suggested by the Funke patent. The Funke patent teaches apparatus for testing fiber optic hubs including looping a fiber optic cable from a transmitter section (37) of any optical interface (30a-30p) to the receiver section (37) of any other optical interface (30a-30p) and lacks any suggestion or motivation to modify the disclosed arrangement to achieve connecting in series each of a plurality of channels of said parallel optical transceiver as recited in the claimed invention of independent claim 1. The Funke patent does not disclose, nor remotely suggest, an

optical wrap plug and an electrical wrap plug, as taught and claimed by Applicants in each of the independent claims 1, 3, 11, 12, and 18, as amended.

The Ducaroir et al. patent adds nothing to the teachings of Funke to render obvious the claimed invention. The Ducaroir et al. patent discloses an apparatus and method for testing the ability of a pair of serial data transceivers to transmit serial data at one frequency and to receive serial data at another frequency. Ducaroir et al. shows a connection between a transmitter of transceiver 12a to a receiver of transceiver 12b and another connection between a receiver of transceiver 12a to a transmitter of transceiver 12b. The Ducaroir et al. patent does not disclose, nor remotely suggest, an optical wrap plug and an electrical wrap plug, as taught and claimed by Applicants in each of the independent claims 1, 3, 11, 12, and 18, as amended.

Thus, each of the independent claims 1, 3, 11, 12, and 18, as amended, is patentable.

Independent claim 11, further recites using the optical wrap plug for applying a predefined data pattern to a first channel of said series connected plurality of channels and for detecting an output from a last channel of said series connected plurality of channels. These limitations also are not shown, nor suggested by the prior art of record. Thus, independent claim 11, as amended, is patentable.

Each of the dependent claims 2, 4-10, and 13-17 depend from respective ones of patentable independent claims 1, 3, 11, 12 further defining the invention, and is likewise patentable.

Applicants have reviewed all the art of record, and respectfully submit that the claimed invention is patentable over all the art of record, including the references not relied upon by the Examiner for the rejection of the pending claims.

It is believed that the present application is now in condition for allowance and allowance of each of the pending claims 1-18 is respectfully requested. Prompt and favorable reconsideration is respectfully requested.

If the Examiner upon considering this amendment should find that a telephone interview would be helpful in expediting allowance of the present application, the Examiner is respectfully urged to call the applicants' attorney at the number listed below.

Respectfully submitted,

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